PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Stabilizing Mechanism for Wheeled Vehicles

We, TORFINN ROSENVINGE JOHNSEN, of Nordengveien 106, Roa, Norway, and Fin Weier Gjersoe, of Fogstadveien 12, Lillehammer, Norway, both of Norwegian nationality, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described, in and by the following statement: —

The present invention relates to a device for stabilizing wheeled vehicles, especially rail cars, so as to prevent the exertion of lateral forces on the occupants or contents of of the vehicles when travelling at high speeds around curves.

Devices for stabilizing wheeled vehicles are already known. These consist of mounting means supported by the truck and providing for the lateral tilting of the body relative to the truck about a horizontal axis extending longitudinally of the vehicle, reversible power means interconnecting the body and truck, and control means, including an element responsive to centrifugal action caused by the vehicle travelling around curves, for controlling the power means so that the body is tilted at an angle corresponding to the movement of the control element.

Known devices of the type described above to some extent realize the object aimed at, but they do not afford the desired comfort to the passengers. This is because the tilting axis of the car body is positioned below the floor so that a passenger, walking longitudinally of the car, is subjected to the centrifugal forces which tends to unbalance him.

The present invention consists in a stabilizing device for wheeled vehicles comprising a bearing member having a lower arcuate bearing surface, supported on bearing rolls rotatably mountable on a wheeled vehicle truck, and an upper surface adapted to support a wheeled vehicle body in such a way that the centre of curvature of the arcuate bearing surface is above the level of the floor of the vehicle body and the vehicle body is laterally tiltable relative to the truck about a horizontal axis extending longitudinally of the vehicle, the device also comprising a hydraulic power system for controlling the position of the arcuate bearing surface relative to the bearing rolls, the hydraulic power system being controlled by an element responsive to centrifugal forces.

Preferably, the hydraulic power system comprises a double acting hydraulic cylinder pivotally supportable at its middle about an axis parallel with and equidistant from the axes of the bearing rolls, the cylinder having a piston rod passing through its centre, and the hydraulic power system being attachable to a wheeled vehicle by attachment of the ends of the piston rod to the frame of the vehicle body so that the piston head is in the centre of the cylinder when the vehicle is travelling in a straight line and the hydraulic cylinder is pivotally supported by the truck.

Conveniently, the piston rod is provided with two axial bores each passing from one end of the rod and opening into the cylinder on either side of the piston head and the bores are connected by pipe lines to a source of pressure fluid through a valve controlled by a pendulum so that the piston head is displaced in the cylinder corresponding to the oscillations of the pendulum.

The device of this invention enables the tilting axis to be at a level above the vehicle floor approximately level with the centre of gravity of a person standing or walking on the floor so that, when the vehicle body is tilted during travel around a curve, the person is also tilted about his center of gravity, and the centrifugal forces on the person are decreased and he is substantially stable.

The present invention provides a device of the type referred to which is simple and reliable in operation and which can be readily incorporated in existing railway cars without requiring any major changes in the vehicle:

A preferred embodiment of the invention is described below with reference to the accompanying drawing in which:

Figure 1 shows an end view of a railway car, partly in cross-section.

Figure 2 shows a fragmentary longitudinal section along the line II—II in Figure 1, and

Figure 3 shows a diagrammatic view illustrating the control means and the connection of these control means to the hydraulic power system.

The car body 1 of a railway car has a floor 2 resting on a frame 3. The car is supported at each end on a truck 4, such as a bogie truck, which may be of any approved design. The truck comprises a frame 5 supported on pair of wheels 6 on rails 7 and with a bolster 8 having a swivel joint 9.

On the bolster 8 and concentric with the swivel axis of the truck is secured a supporting plate 10. This plate supports a pair of spaced transverse arms 11 secured to the plate 10 for example by welding. Pivots 12 are provided on the ends of the arms 11 and bearing rolls 13, provided with flanges 14 are rotatably mounted between the arms on the pivots. The rolls 13, have their axes parallel to the longitudinal axis of the car, and are supported at equal distances from the vertical centre plane P of the car.

The rolls serve as bearing rolls for a bearing member secured to the frame 3 and forming a bearing surface 15 which is part of a cylindrical surface having an axial length corresponding to the distance between the flanges 14 of the rolls 13 and a centre of curvature lying at the point R in the centre plane P at a selected distance from the floor 2.

By varying the distance between the rolls 13 it is possible to vary the distance of the tilting centre R from the floor 2.

The part cylindrical bearing member comprises walls 16 having flanges 17 secured to the frame 3, for example by welding.

In the embodiment shown the power system which tilts the car body 1 relative to the truck 4 consists of a double acting hydraulic cylinder 18. The middle of this cylinder is provided with opposite radial projections 19 resting in sliding blocks 20 which fit into vertical slots 21 in the arms of a forked head 22 of a bolt 23. The bolt 23 is vertically secured to the supporting plate 10 and a stiffening plate 24 fitted between the arms 11. The bolt 23 is so disposed that its axis coincides with the swivel axis of the truck. The axis of the cylinder 18 extends at right angles to the plane P. A piston rod 25 extends through the cylinder 18 and is provided with a piston head 26 which is normally centrally positioned in the cylinder. At each end the piston rod 25 is secured by means of brackets 27 to the frame 3 of the car body 1. The piston rod has axial bores 28 and 28′ whose inner ends near the piston head 26 have openings 29 and 29′ which serve to convey pressure fluid into and out from the respective ends of the cylinder 18.

At a convenient place within the car body 1 a pendulum 30 is suspended and its swing axis extends in the longitudinal direction of the body 1 and preferably coincides with the longitudinal centre plane P. The pendulum controls a hydraulic valve 31 regulating the supply of pressure fluid to the cylinder 18.

When the railway car is driven in a straight line the pendulum 30 hangs vertically so that the supply as well as the discharge of pressure fluid from both ends of the cylinder 18 are prevented.

The valve 31 is connected by means of pipe lines 32 and 33 to a suitable source of pressure fluid (not shown) and by means of pipe lines 34 and 35 to the respective bores 28, 28′ in the piston rod 25.

The hydraulic valve 31 may be of any suitable known type and is therefore not described or shown in detail.

When the railroad car is driven round a curve, such as a left hand curve, the pendulum 30 swings to the right because of the centrifugal forces and the pendulum operates the valve 31 so that the line 34 is placed in communication with the line 32 from the source of pressure fluid and the line 35 with the discharge line 33. This forces the piston head 26 to the right, and the car body is tilted counter clockwise about the centre R. The angle at which the car is tilted is adapted to the driving speed, so in other words, the car body 1 is rotated relative to the truck 4 corresponding to the oscillation of the pendulum. If the car is driven through a right hand curve the oscillation of the pendulum and rotation or tilting of the body 1 take place in opposite direction. When the car emerges from a curve and the pendulum returns to its vertical position the valve 31 causes the car body 1 to rotate in the opposite direction until the car is in its middle or neutral position. The valve 31 then closes the connection to the source of pressure fluid.

In order to prevent unintended minor oscillations of the pendulum it may be provided with suitable known, preferably regulatable, damping or braking devices such as hydraulic devices.

In order to obtain suitable clearance for the movement of the bearing surface 15 relative to the mounting means 22, 23 of the cylinder 18, the middle portion of the surface 15, which does not cooperate with the rolls 13, is cut away, as shown at 36. To prevent

unintended separation of the bearing members 13, 15 the walls 16 are provided with slots 37 and plates 39 secured, for example, by welding to the stiffening plate 24 are provided and are attached to the walls 16 by bolts 38 which pass through the slots 37.

WHAT WE CLAIM IS:—

1. A stabilizing device for wheeled vehicles comprising a bearing member having a lower arcuate bearing surface, supported on bearing rolls rotatably mountable on a wheeled vehicle truck and an upper surface adapted to support a wheeled vehicle body in such a way that the centre of curvature of the arcuate bearing surface is above the level of the floor of the vehicle body and the vehicle body is laterally tiltable relative to the truck about a horizonal axis extending longitudinally of the vehicle, the device also comprising a hydraulic power system for controlling the position of the arcuate bearing surface relative to the bearing rolls, the hydraulic power system being controlled by an element responsive to centrifugal forces.

2. A device as claimed in claim 1 wherein the hydraulic power system comprises a double acting hydraulic cylinder pivotally supportable at its middle about an axis parallel with and equidistant from the axes of the bearing rolls, the cylinder having a piston rod passing through its centre, and the hydraulic power system being attachable to a wheeled vehicle by attachment of the ends of the piston rod to the frame of the vehicle body so that the piston head is in the centre of the cylinder when the vehicle is travelling in a straight line and the hydraulic cylinder is pivotally supported by the truck.

3. A device as claimed in claim 2 wherein the piston rod is provided with two axial bores each passing from one end of the rod and opening into the cylinder on either side of the piston head.

4. A device as claimed in claim 3 wherein the bores in the piston rod are connected by pipe lines to a source of pressure fluid through a valve controlled by a pendulum so that the piston head is displaced in the cylinder corresponding to the oscillations of the pendulum.

5. A device as claimed in any of claims 2 to 4 wherein the hydraulic cylinder is provided with two projections adapted to rest in slots provided in each arm of a forked head for pivotally supporting the cylinder, the forked head being fixable on the truck.

6. A stabilizing device for wheeled vehicles substantially as hereinbefore described with reference to the accompanying drawings.

7. A wheeled vehicle when fitted with the stabilizing device claimed in any preceding claim.

8. A railway car when fitted with the stabilizing device claimed in any of claims 1 to 6.

MARKS & CLERK,
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Agents for the Applicant(s).

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG. 2.

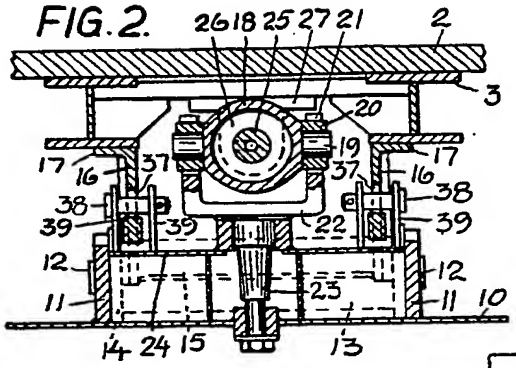

FIG. 3.

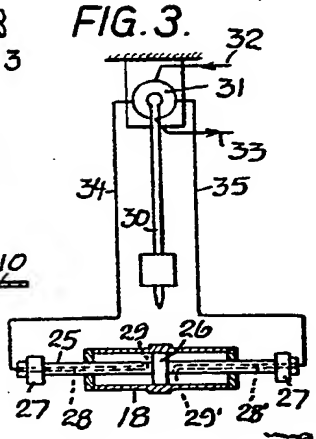

FIG 1.